

ARRAY for the Commutative Property for Multiplication!

Reporting Category Patterns, Function, and Algebra

Topic Exploring properties

Materials

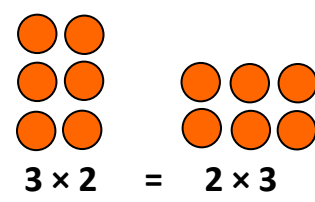
- Two-color counters or other manipulatives
- ARRAY for the Commutative Property for Multiplication! Recording Sheet (attached)
- Example/Non-Example Cards for the Commutative Property for Multiplication (attached)
- Example/Non-Example Mat (attached)

Vocabulary

addend, sum, array, factor, product, property, identity, identity property, commutative property

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Using two-color counters or other manipulatives, demonstrate an array that shows 3 times 2. Ask students to identify the number of rows (3) and the number of columns (2) in the array. Have students draw a picture of your model and then write an expression (3×2) for the picture. Next, use counters to demonstrate an array that shows 2 times 3. Ask students to identify the number of rows (2) and columns (3) in this array. Have students draw a picture of this model beside their first picture and write an expression (2×3) for the picture.



$3 \times 2 = 2 \times 3$
2. Ask students to discuss how these two arrays are similar and different. Have students determine the product for each array, and ask why the two arrays have the same product. Have students write an equal symbol between the two expressions to create an equality statement. Give several more examples of arrays to allow students to draw pictures of the models and discover and discuss the similarities (digits and product) and differences (order). Once students have discovered that the order is the only difference, introduce the *commutative property* for multiplication as the term for this “order property.”
3. Put students into pairs, and give each pair a copy of the Example/Non-Example Mat and a set of Example/Non-Example Cards for the Commutative Property for Multiplication. Also, give each student a copy of the attached ARRAY for the Commutative Property for

Multiplication! Recording Sheet. Have partners sort the cards on the mats, thereby showing examples and nonexamples of the commutative property for multiplication. Have students record their sorts on their individual recording sheets.

Assessment

- **Questions**
 - What is the commutative property for multiplication? What is an example and a nonexample?
 - Is $3 \times 4 = 4 \times 3$ an example of the commutative property for multiplication? Draw a picture to explain your thinking.
- **Journal/Writing Prompts**
 - Draw a picture of an array model for multiplication, and use it to show the commutative property for multiplication.
 - Explain the meaning of the word *commute*. Explain how the meaning of *commute* and *commutative* are similar. Use an example of the commutative property to help explain your thinking.

Extensions and Connections (for all students)

- Distribute sheets of grid paper. Brainstorm with students how they could use the grid paper to model the commutative property for multiplication. Ask students what the product of 3×5 is. Then, have students shade a 3×5 area of blocks on the grid paper and cut out the shaded area. Next, ask students what the product of 5×3 is, and have students shade a 5×3 area of blocks and cut out the shaded area. Have students compare their two cutouts by placing one on top of the other, and identify that the two cutouts are congruent. Ask why the two shapes are congruent. Write the $3 \times 5 = 5 \times 3$ on the board, and ask students whether they agree or disagree with what you just wrote. Have them justify their reasoning. Ask students how the congruence of the two cutouts demonstrates the commutative property for multiplication. The students' justification must include the fact that the order of the factors does not change the product. Give students an opportunity to work in groups to come up with other examples for the commutative property for multiplication, using the grid paper. (Note: Students could use the "equation mat" to place the grids on the mat and the Commutative Property Model recording sheet to record their examples. Both of these items are located in the "Property Commute" lesson.)

ARRAY for the Commutative Property for Multiplication! Recording Sheet

Name: _____ Date: _____

Array Model	=	Array Model
_____ × _____	=	_____ × _____
_____ × _____	=	_____ × _____
_____ × _____	=	_____ × _____

Example/Non-Example Mat

Example	Non-Example

Example/Non-Example Cards for the Commutative Property for Multiplication

Copy the cards on cardstock, and cut out on the dotted lines.

$3 \times 4 = 4 \times 3$	$5 + 3 = 8$	$5 \times 4 = 4 \times 5$	$0 + 0 = 0$
$6 + 3 = 9$	$3 \times 1 = 3$	$4 - 2 = 2$	$2 \times 4 = 4 \times 2$
$3 \times 8 = 8 \times 3$	$2 \times 5 = 5 \times 2$	$4 + 2 = 6$	$9 + 0 = 9$
$15 + 0 = 15$	$7 \times 3 = 3 \times 7$	$8 \times 1 = 8$	$4 + 0 = 4$